PROC. BIOL. SOC. WASH.
93(2), 1980, pp. 388–394

# THE LARVA OF THE CONGRID EEL *ACROMYCTER ALCOCKI* (PISCES: ANGUILLIFORMES), AND THE DISTINCTION BETWEEN CONGRID AND OPHICHTHID LARVAE

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*Abstract.*—The larva of the congrid eel *Acromycter alcocki* is identified and described here for the first time on the basis of juvenile and metamorphic specimens from Hawaii and the western Atlantic. It is an elongate leptocephalus with ten prominent, pigmented loops in the gut. In this it differs from other congrid larvae and approaches the condition found in certain ophichthids. On the other hand, some ophichthid larvae have the characteristic swellings of the gut reduced and approach the condition found in congrids. Aside from the presence or absence of intestinal swellings, the following characters will distinguish congrid from ophichthid larvae: the form of the liver and gall bladder, the degree of expansion of the gut between esophagus and intestine, the termination of the kidney relative to the anus, the nature of the pigment on the intestinal swellings and behind the anus, the form of the caudal fin, the number of branchiostegal rays, and the chondrification of the basibranchials.

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The identification of larval eels with their corresponding adult forms has been an empirical process based largely on the fortuitous capture of metamorphic specimens that combine the characters of larva and adult. When the larva of a particular species has been identified in this way, it is often possible to identify related species by inference even when metamorphic forms are not available. Over the years a framework of knowledge has been developed that has permitted a broad characterization of leptocephali of higher taxonomic groups. In this way most leptocephali can now be confidently identified to family even if the species is uncertain. Occasionally, however, the larva of a particular species may differ so sharply from its relatives that its true identity is not immediately evident. Such is the case presented here.

The senior author located, in the Bernice P. Bishop Museum, a single juvenile specimen of the congrid eel *Acromycter alcocki* (Gilbert and Cramer) 116 mm in total length (Fig. 1). This specimen, the smallest yet seen of the genus *Acromycter,* had twelve large black spots on the ventral midline from shortly behind the head to shortly before the tip of the tail, and a thirteenth spot midlaterally between the last ventral spot and the tail tip. These are not seen in larger specimens and were interpreted as remnants of

Fig. 1. *Acromycter alcocki*, juvenile, 116 mm TL, BPBM 21069.

the pigmentation of the larva. At the same time an unusual leptocephalus, 144 mm standard length, was found in the collections of the Honolulu Laboratory of the National Marine Fisheries Service (Fig. 2). It had twelve large ventral pigment spots from shortly behind the head to shortly before the end of the tail and a thirteenth at the level of the notochord between the last ventral spot and the tail tip. The first 10 ventral spots were each associated with a distinct loop or arch of the gut, a feature always considered characteristic of larvae of the Ophichthidae. Yet the correspondence between the pigment pattern of the larva and that of the juvenile *Acromycter* was so striking that a comparison could not be avoided. The larva had approximately 167 myomeres, well within the range of vertebral counts of *Acromycter alcocki* (164–172).

Meanwhile, the junior author had assembled seven similar larval specimens from the western North Atlantic, including a metamorphic specimen. Despite the prominent gut loops, he doubted their identity as ophichthids. His inquiry to the senior author led to a comparison of material and a conclusive identification of the larvae in question as *Acromycter*.

It has been commonly accepted (Castle, 1965; Fahay and Obenchain, 1978; Smith, 1979) that congrid larvae are characterized by a simple, straight gut, whereas the gut of ophichthid larvae has various loops or swellings. The larval stage of *Acromycter* shows that this is not always true. At the other extreme, some ophichthid larvae have the intestinal swellings greatly reduced. A further clarification of the distinction between congrid and ophichthid larva is needed.

## Material and Methods

Specimens were obtained from the following sources: Bernice P. Bishop Museum, Honolulu (BPBM); material collected by R/V TOWNSEND CROMWELL (TC), Honolulu Laboratory, National Marine Fisheries Ser-

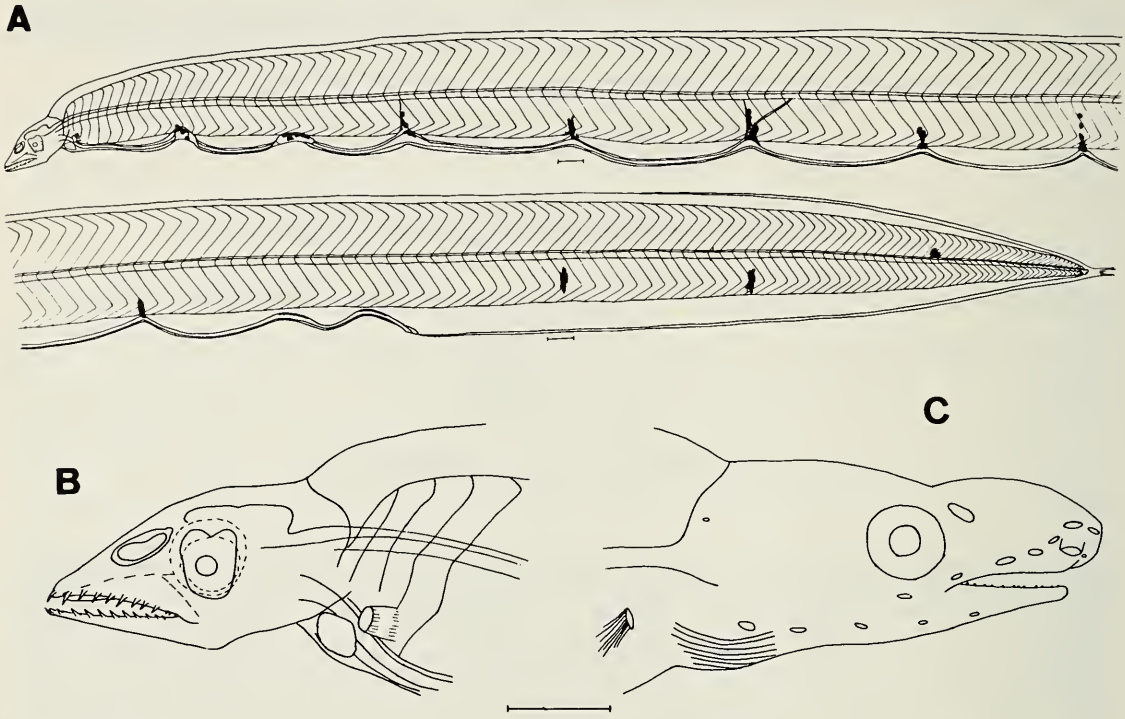


Fig. 2. *Acromycter alcocki*. **A**, Whole view, 170 mm SL, ACRE 9-5. **B**, Head, same. **C**, Head of metamorphic specimen, 146 mm SL, ACRE 7-13. Bar is 2 mm.

vice; Marine Biomedical Institute (MBI), Galveston; Rosenstiel School of Marine and Atmospheric Science, University of Miami (GERDA stations); the University of Rhode Island (Ocean Acre); and collections of F.F.S. ANTON DOHRN (AD), Biologische Anstalt Helgoland, West Germany. All specimens are deposited at the indicated institutions except the ANTON DOHRN specimen, which is at the Academy of Natural Sciences of Philadelphia (ANSP).

Most counts and measurements are self-explanatory. Nephric myomeres are those back to and including the one directly over the posterior end of the kidney, measured at the lateral midline. Predorsal and preanal myomeres are also measured at the midline. Unless otherwise specified, all measurements are standard length (SL).

## Larva of *Acromycter alcocki*

*Study material.*—MBI 561 (17 mm), 20°30′N, 96°06′W, 24 Feb. 1977. ACRE 7-13 (146 mm, metamorphic), 32°18′N, 63°30′W, 8 Sept. 1969. ACRE 9-5 (170 mm), 31°54′N, 64°17′W, 17 March 1969. ACRE 12-35 B (ca. 183 mm), 32°28′N, 64°02′W, 7 Sept. 1971. ACRE 14-9A (87+ mm), 31°46′N, 63°38′W, 7 June 1972. GERDA 92 (60 mm), 25°10′N, 79°41′W, 19 Apr. 1963.

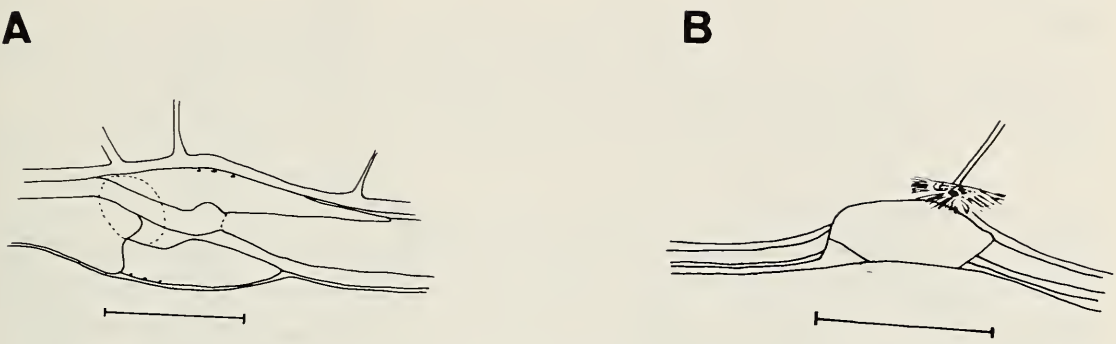


Fig. 3. **A**, Second liver lobe of an ophichthid, *Bascanichthys bascanium*, 79 mm SL, showing gall bladder and gut expanding posteriorly. **B**, Second liver lobe of *Acromycter alcocki*, 170 mm SL; gall bladder hidden by liver, gut not expanding posteriorly. Bar is 1 mm.

GERDA 497 (34 mm), 26°41′N, 79°00′W, 3 Feb. 1965. ANSP 143371, (158 mm, metamorphic), AD 183, 25°31′N, 62°00′W, 6 Apr. 1979. BPBM 24021 (144 mm), TC-59-44-2, 20°13′N, 160°10′W, 25 July 1972. BPBM 21069 (116 mm, juvenile), TC-66-11, 20°21′N, 158°08′W, 19 Aug. 1975.

*Description of larvae.*—Body elongate, depth 5–10% SL (deeper in small specimens); caudal fin well developed; preanal length 70–83% SL; head 3–9% SL (relatively longer in small specimens). Total myomeres 166(2), 167(2), 169(1), 172(1), 173(1); preanal myomeres 100–104; nephric myomeres 51–54. Ten loops or arches in gut, first two associated with lobes of liver, located beneath myomeres 13–16, 21–26, 29–34, 39–43, 50–54, 59–64, 69–74, 78–85, 89–94, and 97–104. Pigment associated apically with each loop, consisting of one or several melanophores internally and on body wall, sometimes extending dorsally almost to aorta. Three postanal pigment patches, mainly on body wall, first two located near ventral edge of myomeres 109–113 and 122–129, the third just above notochord at myomere 138–148.

*Description of metamorphic specimens.*—Body leptocephaloid; anus migrating forward, at myomeres 47–65. Head elongate with bulbous snout, posterior nostril near anterodorsal margin of eye; four pores along upper jaw, two on tip of snout, one just above anterior nostril, and eight in preoperculomandibular canal. Definitive teeth developing in a single series on mandible and maxilla, and in two parallel rows on roof of mouth.

*Description of juvenile.*—Typical of *Acromycter alcocki*. Twelve large, dark spots on ventral midline, from shortly behind head to shortly before tip of tail. A thirteenth spot laterally between last ventral spot and tip of tail.

*Identification.*—The metamorphic specimens and the juvenile show clearly that this type of larva belongs to the genus *Acromycter* Smith and Kanazawa. The Hawaiian species is *A. alcocki*. Work in progress by the senior

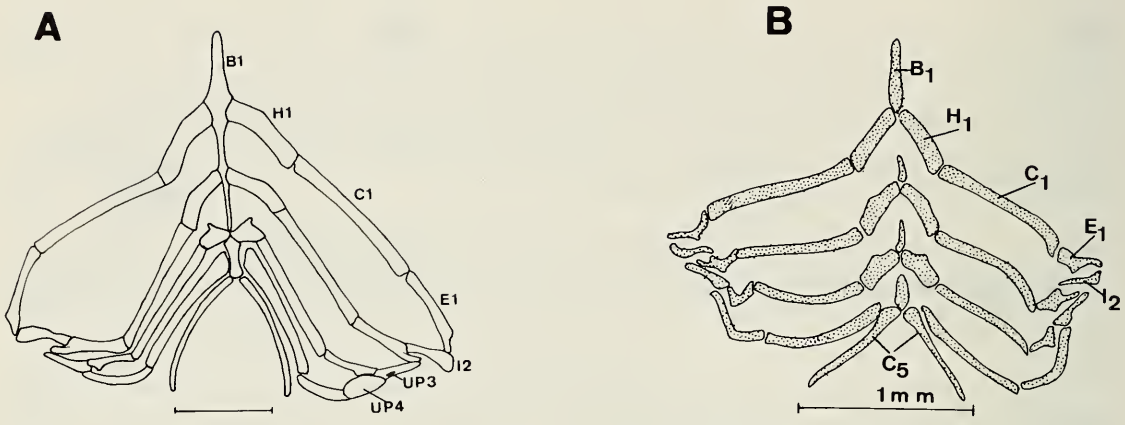


Fig. 4. **A,** Gill arches of metamorphic *Acromycter alcocki,* 146 mm SL, ACRE 7-13, showing single basibranchial bar for $B_1$–$B_3$. **B,** Gill arches of an ophichthid (metamorphic *Ophichthus ophis,* 120 mm SL), showing separate $B_1$–$B_3$. B = basibranchial, H = hypobranchial, C = ceratobranchial, E = epibranchial, I = infrapharyngobranchial.

author indicates that two species of *Acromycter* are present in the western Atlantic, differing only in the number of vertebrae. *Acromycter peturbator* (Parr) has 159–162 vertebrae and the other species has 167–171. The latter appears indistinguishable from the Hawaiian species and is therefore referred to *A. alcocki.* Based on the myomere counts, all the larvae examined seem to belong to *A. alcocki.*

## Identification of Congrid and Ophichthid Larvae

Most congrid larvae have a simple, straight gut with at most a slight expansion at the liver. Most ophichthid larvae have prominent swellings or loops in the gut, each associated with some degree of pigmentation. The problem arises with a few ophichthids, such as *Bascanichthys* and some species of *Ophichthus,* in which the gut loops are greatly reduced, and a few congrids, principally *Acromycter,* in which distinct gut loops are present. In addition to learning these aberrant forms individually, several characters can be used to distinguish the larvae of the two families in a more general sense.

Ophichthid larvae have two (subfamily Ophichthinae) or three (subfamily Myrophinae) pronounced liver lobes along the thin esophagus. The gall bladder is on the last lobe and is not concealed by the liver (Fig. 3A). Most congrid larvae have a single liver lobe, but *Acromycter* has two. The gall bladder in *Acromycter* is associated with the second lobe, as in ophichthines, but it is largely hidden by the liver (Fig. 3B).

In ophichthid larvae the gut expands abruptly between the esophagus and

the intestine (Fig. 3A); in *Acromycter,* the congrid most likely to be confused with an ophichthid, it does not (Fig. 3B).

In congrids the kidney terminates well in front of the anus, usually by more than 20 myomeres. In ophichthids the kidney terminates 0–15 myomeres in front of the anus.

In larvae of the Ophichthidae the caudal fin is often reduced or lost well before metamorphosis. In congrid larvae the caudal fin is always present.

In ophichthids the pigment associated with the gut swellings is located mainly below the kidney on the dorsal surface of the gut. In *Acromycter* the pigment associated with the gut loops lies dorsal to the kidney. Postanal pigment in ophichthids is either in the form of small superficial melanophores or 3–12 large internal spots just beneath the notochord. *Acromycter* has three large post-anal spots, but they are largely superficial; the first two are more ventral than those of ophichthids, and the last one is dorsal to the notochord.

In specimens near metamorphosis, the numerous (17 or more) branchiostegal rays characteristic of ophichthids, overlapping on the ventral midline, are visible. Congrids have fewer branchiostegals (generally fewer than 12), and these do not overlap on the ventral midline.

The gill arches of congrids and ophichthids differ in their development, although this can be seen only in stained preparations. In congrids the first three basibranchials develop as a single chondrification (Fig. 4A), whereas in ophichthids all four basibranchials develop as separate chrondrifications (Fig. 4B).

## Acknowledgments

We thank the following for the loan of specimens. J. E. Randall, Bernice P. Bishop Museum, Honolulu; R. S. Shomura, Honolulu Laboratory, National Marine Fisheries Service; C. R. Robins, Rosenstiel School of Marine and Atmospheric Science, University of Miami; W. H. Kreuger, University of Rhode Island; F.-W. Tesch, Biologische Anstalt Helgoland. The MBI specimen was collected during a study of leptocephali of the Gulf of Mexico supported by the National Science Foundation (BMS 75-08675). Travel funds for the senior author's visit to Honolulu were also provided by the National Science Foundation (INT-77-12568). The senior author wishes to thank Dr. F.-W. Tesch for the opportunity to participate in the cruise of the F.F.S. ANTON DOHRN to the Sargasso Sea in 1979, during which one of the metamorphic specimens was collected. Figure 1 was drawn by Mary H. Fuges, the remainder by the junior author. This is a contribution from the Marine Biomedical Institute and the Department of Human Biological Chemistry and Genetics, University of Texas Medical Branch at Galveston.

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